In the Specification

On page 1, please replace the first paragraph after the "Cross-Reference to Related Applications" subtitle with the following paragraph.

A3

This application claims the benefit of U.S. provisional application serial no. 60/183,663, which was filed on February 18, 2000 and is herein incorporated by reference. This application is also related to copending U.S. application serial no. 09/353,325, entitled "High-Throughput Infrared Spectrometry" and filed July 14, 1999, now U.S. Pat. No. 6,483,112, as well as U.S. application serial no. 09/507,293, entitled "High-Volume On-Line Spectroscopic Composition Testing of Manufactured Pharmaceutical Dosage Units" and filed on February 18, 2000, both of which are herein incorporated by reference.

On pages 2-3, please replace the second paragraph that begins on page 2 after the "Summary of the Invention" subtitle with the following paragraph.

A4

In preferred embodiments, the spectrometer can further include a switching array having a plurality of switched outputs that are each operatively connected to an input of at least one of the illumination sources. The spectrometer can further include at least a first spectrally selective element~~having~~ and at least a second spectrally selective element, with the first spectrally selective element having a different spectral response than the second spectrally selective element, with the first spectrally selective element being located in an optical path between the detector and a one of the illumination sources that is operatively connected to a first of the switched outputs and the second spectrally selective element being located in an optical path between the detector and a one of the illumination sources that is operatively connected to a second of the switched outputs. The spectral responses of the spectrally selective elements can correspond to different absorption bands of a predetermined substance. The switching array can be operative to define an intensity level for one or more of the sources. The switching array can be operative to define an intensity level for one or more of the sources by determining an illumination time period for the one of the sources relative to an illumination time period

for another of the sources. The spectrometer can further include sequencing logic operative to cause the switching array to switch the sources in a sequence of successive overlapping spatial patterns. The sequencing logic can be operative to cause the switching array to switch the sources in a Hadamard sequence. The spectrometer can further include a plurality of spectrally selective elements having different spectral responses and each being located in an optical path between at least one of the illumination sources and the detector. The spectrally selective elements can be passive. The spectrally selective elements can be reflectors, which can be at least generally parabolic. The reflectors can be at least generally ellipsoidal. The sources can be substantially the same, or they can be of a same type. The spectrometer can be a microscopic instrument, with the sources each producing a luminous flux of at most about 10 millilumens~~lumens~~ at the detection area. The spectrometer can be a macroscopic instrument, with the sources each producing a luminous flux of at most about 1 lumen at the detection area. The sources can be placed within 2 or even 1 cm of the detection area. The sources can have a nominal supply voltage of twelve volts or less, or even five volts or less. The sources can be broadband sources. The spectrometer can further include a plurality of narrow-band dielectric filter elements each located in a optical output path of at least one of the sources. The sources can be broadband infrared sources. They can be incandescent sources. They can also be narrow-band sources, such as narrow-band infrared sources. The sources can be constructed from bulk semiconductor materials. At least a plurality of the sources can be operatively connected to a single power supply. The illumination sources can be positioned to illuminate different sub-areas of the detection area. At least a first portion of the beams can overlap within the sample area. The detector can be located to receive the beams from the illumination sources after they are reflected off of the sample. The detector can be a multi-element detector array. The spectrometer can further include a circular support for the array, with the detection area being located along a central axis of the circular support. The circular support can surround an optical path from the detection area to the detector. The detector can be part of a microscope. The spectrometer can further include a spectral matching module responsive to the spectroscopic signal output and operative to perform spectral matching operations with one or more known substances. The detector

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can include a plurality of detector elements, with the detection area being divided into a plurality of detection sub-areas, and with each of the detector elements being aligned with one of the detection sub-areas. The detector can be an array detector that includes at least the detector elements disposed in an array, and the spectrometer can further include a plurality of optical conductors each including first and second ends, wherein each of the first ends is responsive to at least one of the detection sub-areas, and wherein each of the detector elements is responsive to one of the second ends of at least one of the optical conductors. The array can include a plurality of substantially similar illumination sources.

On page 4, please replace the second paragraph with the following paragraph.

A5

In preferred embodiments, the step of illuminating can include the step of first illuminating the sample with at least a first of the beams and the step of then illuminating the sample with at least a second of the beams. The method can further include filtering the first plurality of the beams with a first filter characteristic and filtering the second plurality of the beams with a second filter characteristic, with the first and second filter characteristics being different. The steps of illuminating the sample with first and second beams can be performed for different beam energies. The steps of illuminating the sample with first and second beams can be performed for different amounts of time to achieve the different beam energies. They can further include the step of filtering ones of the plurality beams of light according to different filter characteristics. The method can further include the step of concentrating the beams. The step of concentrating can include a step of collimating. The step of concentrating can include a step of focusing. The method can further include the step of matching results of the step of deriving with known spectra. The step of detecting can detect a spatially resolved image and the method can further include the step of evaluating the spatially resolved image to determine composition distribution within at least a portion of the sample. The steps of illuminating, detecting, deriving, and evaluating can be performed for pharmaceutical dosage units. The steps of illuminating, detecting, deriving, and evaluating can be performed for pathology samples. The steps of illuminating, detecting, deriving, and

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evaluating can be performed for biological tissue. The step of illuminating can employ a plurality of substantially similar beams of light.

On pages 5-6, please replace the fifth paragraph that begins on page 5, with the following paragraph.

A6

Spectrometers according to the invention can be less expensive and safer to use as well. Because the sources in~~a~~ multi-source arrays are smaller, they can usually be placed closer to the sample, allowing a relatively larger proportion of the radiated illumination to reach the sample. This reduces the amount of energy wasted by the source and the amount of heat generated by the fixture. As a result, instruments according to the invention can be more energy-efficient and less prone to cause fires or burns. Smaller arrays may also be driven by lower voltages, resulting in further energy savings and additional safety. And smaller arrays of sources may allow a designer of a spectrometric system to avoid the use of some optical elements, such as optical fibers, which can be optically inefficient, complicated, and introduce additional cost. The benefits of systems according to the invention may be particularly important in systems that use large array detectors, which require~~a~~ very high light levels over a large number of detectors.

On page 7, please replace the description of Fig. 5 with the following paragraph.

A7

Fig. 5 is a flowchart illustrating the operation of the system of Fig. ~~5;~~1;

On page 7, please replace the first two paragraphs after the "Detailed Description of an Illustrative Embodiment" subtitle with the following two paragraphs.

A8

Referring to Fig. 1 a spectrometer 10 according to the invention includes a source driver 12, a source array 14, a detector 20, and spectrometric logic 22. The spectrometer also includes a spectrally selective ~~element 18~~element, 18A, 18B that is located in an optical path between the source array and the detector. This spectrally selective element

can be located between the array and a sample 24 (position A) or between the sample and the detector (position B).

A8 Cont'd

The source array 14 is a multi-source array. Rather than including a single large source, it includes a number of smaller sources. Each of these sources is preferably separately concentrated onto the sample by individual concentrating elements in a concentrating element array 16. The concentrating element array can include lenses or other transmissive elements placed between~~the~~ each source and the sample, or it can include mirrors or other reflective elements that can be placed near the sources.

On page 8, please replace the second full paragraph with the following paragraph.

A9

The source driver 12 can include a power supply, and may also include a switching array that has separately switchable outputs provided to subsets of the lamps in the array. The switching array can be made up of a number of different types of switching elements that switch a power signal or a control signal to the sources, such as transistors, relays, or digital-to-analog converter elements. The switching array can also include optical switching elements that switch the optical output of the sources, such as shutters, tunable filters, or movable mirrors. Embodiments that include switching arrays preferably provide an operative connection between the source driver and the spectrometric logic. For example, control inputs of the switching array can receive switching signals from a control output of the spectrometric~~sepectrometric~~ logic 22, or information about the state of the switching array can be provided to the spectrometric~~sepectrometric~~ logic.

On page 9, please replace the second full paragraph with the following paragraph.

A10

The spectrally selective element 18A, 18B can be one of a number of different types of wavelength-dependent optical elements that separate light into spectral components, such as prisms, filters, gratings, or monochromators. It can operate by transmission (e.g., a filter in front of a source array element) or by reflection (e.g., a parabolic or elliptical reflector coated with dielectric material and located around the

source array element). The spectrally selective element can be a single element spanning the whole section of the optical path between the source array 14 and the detector 20. It can also be a compound element or set of elements with different sub-elements placed in portions of the optical path between the source array and the detector.

On page 11, please replace the second full paragraph with the following paragraph.

A11

In operation, ~~Referring~~referring to Fig. 5, a user of the spectrometer 10 begins by placing a sample 24 in an optical path between the source array 14 and the detector 20 (step 100). Although the source array could be turned on before the placement of the sample, it may be preferable to do so after the sample is in place (step 102). Once the sample is illuminated, the spectrometric logic 22 receives spectral information from the light reflected from the sample (104).

On pages 12-13, please replace the third paragraph that begins on page 12 with the following paragraph.

A12

Referring to Fig. 6, optical conductors, such as optical fibers, can also be used to convey detected light in the system to facilitate imaging of widely-spaced sampling areas. In one such embodiment, a number of separate sources 110 each illuminate a target sample in one of a number of separate wells 112. The transmitted light is then collected by one of a number of optical fibers 114 and conducted to individual elements of a detector array 116. This detector array can be a two-dimensional ~~off the shelf~~off-the-shelf infrared imaging array. Although a one-to-one correspondence between detector elements in the array is possible, each of the fibers can conduct light to one or more of the detector elements, each of the detector elements can receive light from one or more of the fibers, and not all detector elements need to be used to monitor light from a fiber. The spatial mapping between detector elements and vessels can follow an ordered sequence, or it can be random, with the system using a stored map to express the correspondences. The system can even learn the map by itself, by successively illuminating the sources and looking for output signals. This arrangement has the

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advantage of allowing for inexpensive but reliable detection in a system where the samples are spatially located that is not convenient or possible for conventional imaging optics. It can also allow for a highly versatile instrument that allows its user to easily and safely change the location from which optical information is derived.